OMCR

Oxford Medical Case Reports, 2019;3, 124–126

doi: 10.1093/omcr/omz014
Case Report

CASE REPORT

'My watch kept on alarming all night about my heart rate': diagnosis of asymptomatic atrial fibrillation with fast ventricular response in a patient with a recent TIA as the result of a smartwatch alarm

Immo Weichert*

Department of Acute Medicine, Ipswich Hospital, East Suffolk and North Essex NHS Foundation Trust, Ipswich IP4 5PD, Suffolk, UK

*Correspondence address. Department of Acute Medicine, Ipswich Hospital, East Suffolk and North Essex NHS Foundation Trust, Heath Road, Ipswich IP4 5PD, Suffolk, UK. Tel: (44) 1473 702021; E-mail: immo.weichert.mail@gmail.com, immo.weichert@ipswichhospital.nhs.uk

Abstract

Atrial fibrillation is a leading cause of stroke and early detection and treatment of the condition are critical. Paroxysmal atrial fibrillation is often asymptomatic and may go undetected and untreated in the routine management of patients with ischaemic strokes or transient ischaemic attacks. Prolonged monitoring does increase the diagnosis rate of atrial fibrillation after an ischaemic cerebrovascular event. Biometric and ECG sensors have been integrated with smartphones, apps and wearable devices which may increase rates of diagnosis of arrhythmias. This case study describes an asymptomatic patient who two months after her initial transient ischaemic attack was alerted by her smartwatch about her nocturnal tachycardia and was subsequently diagnosed with atrial fibrillation ensuring appropriate secondary prophylaxis.

INTRODUCTION

Atrial fibrillation (AF) is the most frequently diagnosed arrhythmia with a prevalence in Europe of approximately 1.5%. As the population ages, this number is likely going to double by the year 2060 [1]. Strokes as a result of AF are common and carry a high risk of death or disability. Their prevention is a global public health priority. Anticoagulation can efficiently reduce the risk of cardio-embolic events secondary to AF; however, this arrhythmia is often paroxysmal and asymptomatic and may not be recognized as a risk factor. Prolonged monitoring of heart rhythm improves the detection rate of AF and has been recommended in patients with cryptogenic strokes or transient ischaemic attacks (TIA). The recommendations for the length of monitoring vary between 30 days of monitoring in the United States and 72 hours in Europe [2]. Recently, smartwatch technology has been developed to identify arrhythmias that may prove to be a non-invasive or less costly alternative that is open to a broader population.

CASE REPORT

A 59-year-old female presented to Acute Medicine via the Emergency Department because she was concerned about her fast heart rate. Her smartwatch had alarmed several times during the preceding night that her pulse rate exceeded 120 beats per minute (bpm) whilst she was inactive and indicated a fluctuating rate of 130–140 bpm. The smartwatch (Apple Watch

Received: November 18, 2018. **Revised:** January 6, 2019. **Accepted:** January 29, 2019

Series 2, Apple Inc.) had been used without any medical or diagnostic intention and did not have any specific features to diagnose arrhythmias. The patient remained tachycardic the following morning but felt well and was asymptomatic. She denied palpitations, dizziness, chest pain, shortness of breath or infective symptoms. She gave a past medical history of type 2 diabetes mellitus, arterial hypertension, hypercholesterolaemia, obesity, temporal lobe epilepsy and osteoarthritis. She was a non-smoker and drank alcohol only very occasionally. Two months prior she had suffered a TIA which had been managed in accordance with the locally implemented national stroke guidelines. One day before her TIA she had a brief episode of diaphoresis and palpitations, her smartwatch had then indicated a heart rate of 144 bpm. When reviewed by the stroke team, she was found to be in sinus rhythm, computed tomography of her brain was normal, bilateral carotid dopplers showed no evidence of atheroma. She was also found to be in sinus rhythm throughout during an outpatient 24 hour ECG that was recorded a fortnight after her presentation. Myocardial perfusion imaging in the past had shown no evidence of ischaemia and a normal ejection fraction. On examination, she was comfortable but had an irregular pulse and a heart rate that was fluctuating between 130 and 140 bpm. The rest of her observations were normal. ECG showed AF with a fast ventricular response. There was no evidence of heart failure, valvular disease or an infection clinically. Blood tests including urea and electrolytes, liver function tests, full blood count, thyroid function tests and troponin were unremarkable as was her chest X-ray and urine dip. She was started on Bisoprolol which controlled her heart rate. Her CHA_2DS_2-VASc Score was five, equating to an annual stroke risk of 7.2%. She was hence anticoagulated with a direct oral anticoagulant. Clopidogrel, which had initially been started at her presentation to the TIA clinic, was stopped. She is currently awaiting outpatient transthoracic echocardiography.

DISCUSSION

AF is a major risk for stroke disease, often with devastating consequences. It is associated with a five-fold risk of stroke. Cardio-embolic strokes resulting from AF are more severe and are associated with higher risks of morbidity and mortality than those of other aetiologies [3, 4]. Patients with a previous TIA and AF have an increased incidence of major stroke [5]. Anticoagulation can significantly reduce this, making it an easily modifiable risk factor. Unfortunately, AF is often paroxysmal and asymptomatic making its diagnosis as a risk factor difficult. A large proportion of patients with paroxysmal AF as cause of their stroke will not be diagnosed with it at the time of their hospital discharge [6]. Extended invasive or non-invasive monitoring can detect intermittent AF that would otherwise be missed [2].

Advances in technology have led to the integration of physiological sensors in mobile phones and watches as well as devices that communicate with apps on smartphones. Many are not intended as medical devices per se and may not adequately measure the heart rate, particularly in the presence of AF, often measuring lower compared to electrocardiography [7]. Nevertheless, several large studies that were published recently have proven the feasibility of using a smartwatch to discriminate between sinus rhythm and AF. In November 2017, the US Food and Drug Administration cleared the KardiaBand (AliveCor Inc.), a smartwatch-accessory to take a single-channel ECG, and in September 2018 an electrocardiography app, part of the Apple Watch Series 4 [8–10]. The American Heart Association fell short of endorsing this innovation but reported favourably about it in its patient aimed news feed after their president was on-stage at Apple's product announcement [11]. As this technology will be used in wider populations, this will likely increase diagnosis rates of arrhythmias and change ways patients present. Affordability and differences in technology literacy will determine which groups will be most affected. There is a risk of false-negative and false-positive results, with the additional issue of lay interpretation. Healthcare professionals may find themselves having to reassure worrying users with no pathology whilst patients with symptoms of serious illness may not seek help as their smartwatch or app will give them a reassuringly normal report. We will certainly see more patients anticoagulated who have infrequent and asymptomatic episodes of AF but lack randomized trial evidence that this will improve outcomes. The overall effect this will have is yet unknown [12].

In this patient, the smartwatch correctly recognized a tachycardia and alerted the otherwise asymptomatic patient to seek help. As a result, she was diagnosed with AF which led to appropriate secondary prevention to reduce her risk of further cerebrovascular accidents.

CONFLICT OF INTEREST STATEMENT

The author has no conflicts of interests to declare.

FUNDING

This article did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

CONSENT

Written consent for submission and publication of this case report has been obtained from the patient in line with the Committee on Publication Ethics guidance.

REFERENCES

1. Ceornodolea AD, Bal R, Severens JL. Epidemiology and management of atrial fibrillation and stroke: review of data from four European countries. *Stroke Res Treat* 2017;**2017**:8593207.
2. Haeusler KG, Tütüncü S, Schnabel RB. Detection of atrial fibrillation in cryptogenic stroke. *Curr Neurol Neurosci Rep* 2018;**18**:66.
3. Marini C, De Santis F, Sacco S, Russo T, Olivieri L, Totaro R, *et al*. Contribution of atrial fibrillation to incidence and outcome of ischemic stroke: results from a population-based study. *Stroke* 2005;**36**:1115–9.
4. Henninger N, Goddeau RP, Karmarkar A, Helenius J, McManus DD. Atrial fibrillation is associated with a worse 90-day outcome than other cardioembolic stroke subtypes. *Stroke* 2016;**47**:1486–92.
5. Atrial fibrillation investigators. Risk factors for stroke and efficacy of antithrombotic therapy in atrial fibrillation: analysis of pooled data from five randomized controlled trials. *Arch Intern Med* 1994;**154**:1449–57.
6. Sposato LA, Cipriano LE, Saposnik G, Vargas ER, Riccio PM, Hachinski V. Diagnosis of atrial fibrillation after stroke and transient ischaemic attack: a systematic review and meta-analysis. *Lancet Neurol* 2015;**14**:377–87.
7. Kroll RR, Boyd JG, Maslove DM. Accuracy of a wrist-worn wearable device for monitoring heart rates in hospital

inpatients: a prospective observational study. *J Med Internet Res* 2016;**18**:e253.
8. Bumgarner JM, Lambert CT, Hussein AA, Cantillon DJ, Baranowski B, Wolski K, *et al*. Smartwatch algorithm for automated detection of atrial fibrillation. *J Am Coll Cardiol* 2018;**71**:2381–8.
9. Tison GH, Sanchez JM, Ballinger B, Singh A, Olgin JE, Pletcher MJ, *et al*. Passive detection of atrial fibrillation using a commercially available smartwatch. *JAMA Cardiol* 2018;**3**:409–416.
10. FDA. Statement from FDA Commissioner Scott Gottlieb, M. D., and Center for Devices and Radiological Health Director Jeff Shuren, M.D., J.D., on agency efforts to work with tech industry to spur innovation in digital health [Internet]. FDA Press Announcements. Office of the Commissioner; 2018 https://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm620246.htm (31 December 2018, date last accessed).
11. American Heart Association News. New watch can help doctors monitor your heart in real time [Internet]. American Heart Association. 2018 https://www.heart.org/en/news/2018/09/12/new-watch-can-help-doctors-monitor-your-heart-in-real-time (31 December 2018, date last accessed).
12. Cifu A, Prasad V. Wearables, smartphones and novel anticoagulants: we will treat more atrial fibrillation, but will patients be better off? *J Gen Intern Med* 2016;**31**:1367–8.